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WEATHER BUREAU
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TECHNICAL MEMORANDUM NO. 5

RADAR ECHOES ASSOCIATED WITH WATERSPOUT ACTIVITY

by

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REGION II TECHNICAL MEMORANDUM NO. 5

Radar Echoes Associated With Waterspout Activity

Radar observations and analyses of waterspout conditions near Gulf Coastal stations over several years have lead to helpful conclusions relative to identifying and tracking waterspouts. When convective thunderstorms are in the developing stage along the coast, individual cellular echoes - most commonly two to five miles in diameter, of weak to moderate intensity, and not necessarily tall - occasionally develop an observable individual cyclonic rotation. A "half-moon" shaped echo develops from the formerly non-distinctive round or oblong cell and continues to move with the basic flow of the general convective activity. Approximately 50 such occurrences with associated waterspouts have been observed during the past few years. Such a development on the PPI scope is not observed in all cases of reported waterspouts; but, when the above described events are noted, they are highly indicative of conditions favorable for a waterspout.

The life cycle of the radar echo characteristics of convective cells associated with waterspout activity is ideally shown in figures 1 through 6. Figure 1 shows the initial cell which is either round or oblong and generally two to five miles in diameter. Figure 2 shows a wedge developing in the cell. As the wedge increases through the cell as in Figure 3, cyclonic rotation becomes noticeable; and the echo continues to take on a more typical moon shape as shown in Figure 4. It is believed that the waterspout occurs during the portions of the cycle in Figures 3 and 4. Eventually the cell hollows out while the cell height decreases sharply as in Figure 5 and dissipates, or refills in new convective development as seen in Figure 6.

The time interval between any of the consecutive stages will vary from seconds to several minutes with the complete cycle varying from several minutes upwards.

All cases are not as ideal as that shown above. In many cases, some of the stages are almost obscured. In examining specific cells that are suspect, it is frequently advantageous to reduce the receiver gain or attenuate the signal in order to more clearly define the various stages of the cycle. Perhaps the use of short pulse on the WSR-57 might be useful for this purpose.

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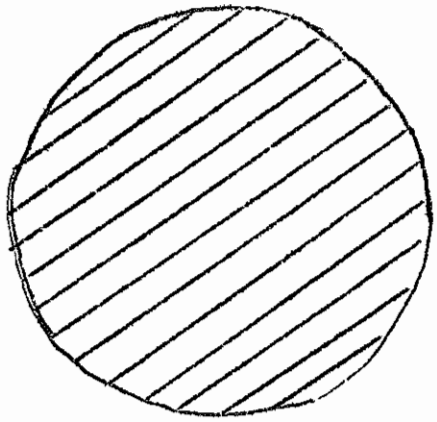

Fig. 1. Shower cell about 2 to 5 miles in diameter.

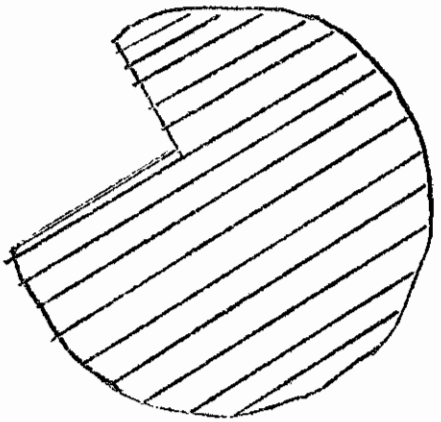

Fig. 2. Wedge developing in cell.

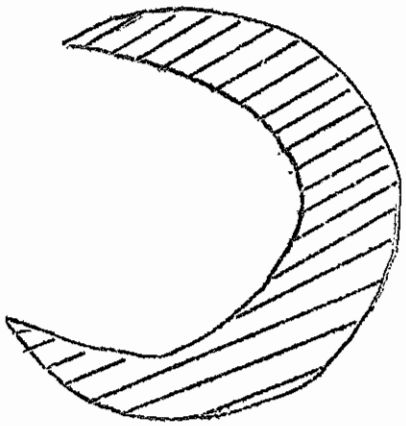

Fig. 3. Rotation becomes noticeable.

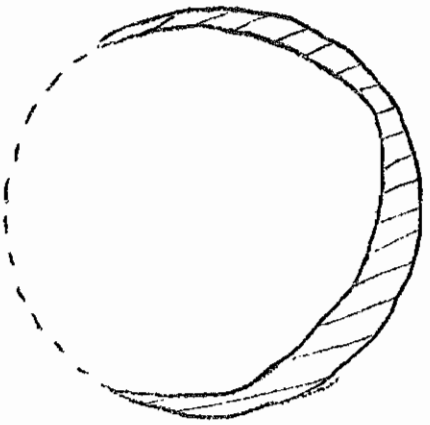

Fig. 4. Moon shaped echo with cyclonic rotation.

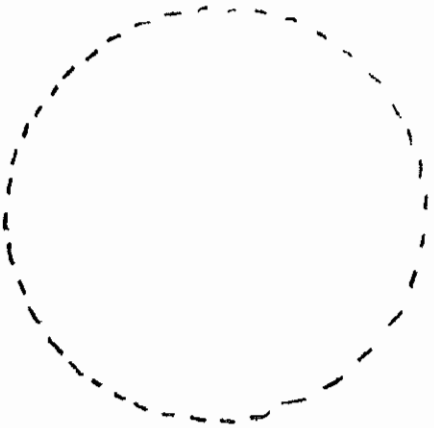

Fig. 5. Hollowed out cell just prior to dissipation or redevelopment

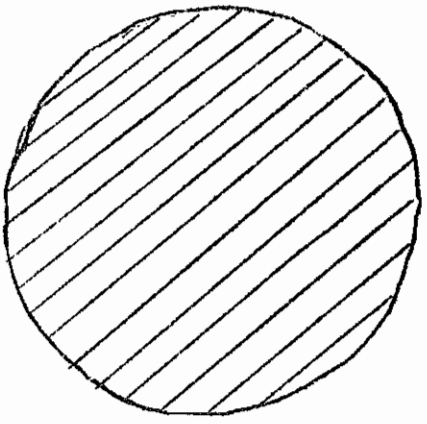

Fig. 6. Newly redeveloped convective cell.